

THE MÜTTER LECTURES ON SELECTED TOPICS IN SURGICAL PATHOLOGY.

SERIES OF 1890-1.¹

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LECTURE VIII.

TUBERCULOSIS.

SYLLABUS. *Tuberculosis.*—Slowness of English and American writers to properly appreciate the matter of surgical tuberculosis. Tuberculosis of lymphatic glands; of bones; of joints; of tendon sheaths. Character of infectious granuloma everywhere the same.

SO much has been said and written about tuberculosis within the past ten years that it seems now hardly necessary to try to educate the professional public as it seemed a few years ago. It has always struck the writer as one of the curiosities of medicine that the English speaking people should be so slow to appreciate the frequency of tubercular processes in parts of the body aside from the lungs. Those who were thoroughly familiar with its pathology and clinical aspects in the lungs were yet extremely slow to acknowledge its common existence elsewhere. For instance, I recall one of my old and esteemed teachers, who, only fifteen years ago, took occasion to assure his classes that tubercle was never found in the bones. Such a statement as this was much worse than nothing, since it rendered many of his auditors in-

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disposed to pay that attention to the matter which it deserved; and so I have observed that, with a few striking exceptions, English and American authors alike have been extremely slow to recognize that which has long been recognized on the Continent. Such a thesis, for instance, as that of Nelaton, which was published over fifty years ago, and which contained illustrations fully equal to most of those which appear now, and in which he described carefully and explicitly both disseminated and confluent tubercle, has scarcely been alluded to by his English-speaking successors. These gentlemen, on the contrary, have gone on, some of them even to the present time, disregarding knowledge which could so easily be obtained, and describing scrofula of bones and glands as if no better information were at hand than was afforded one hundred years ago. A new school of young and accomplished pathologists has grown up in Great Britain and in this country, who have atoned in large measure for the wilful ignorance or misrepresentation of their elders—men, for instance, like Treves and Sutton, Senn and Gerster, and others, to whom the present generation is largely indebted for the insistence with which these views have been promulgated. Nevertheless so much literature is now at hand, even to the student who reads only his mother tongue, that it hardly seems necessary to attempt any general discussion of the disease in its surgical aspects, nor to do more than ask your attention to a few of its more interesting or less known phases. First of all with regard to its specific and infectious features, there is no time now in which to go over the experimental proof of the doctrine of specific infection. He who is not reasonably well informed in this topic will have little use for such lectures as these.

That the tubercle bacillus possesses facultative pyogenic powers has been shown in an earlier lecture. That most of the abscesses caused by breaking down of tubercular gummata, or of specific granulation tissue, are due to a secondary infection will be spoken of later. Our interest at present is rather in the direction of certain manifestations of the disease with reference to tracing, if possible, the port of entry of the specific germs, or the path of infection. It may be said, however,

with regard to the cold abscesses which so often result from slow tubercular processes, that bacilli are relatively seldom found in their puruloid. This failure to find them is easily explained, since in many of these cases the puruloid collection is months or even years old, and all living organisms have long since died out in such material. On the contrary, the original membrane or condensed layer of cells, by which protection was at first afforded the healthy tissues against infection, has become more and more firmly organized and still constitutes the membrane to which the old and entirely improper term pyogenic was misapplied. It was shown early in this course of lectures that the proper distinction for this membrane should be *pyophylactic*, implying the protection which it really affords. In certain other cases of recent cold abscesses, the microscope and the culture medium yield no evidence of bacilli, while, nevertheless, inoculation experiments succeed. This is to be explained through the medium of spores which are unrecognizable by other methods, but which manifest their specific peculiarities when planted in the living animal.

Tuberculosis of lymphatic nodes.—These comprise practically all the glandular manifestations which the old writers grouped under the head of struma or scrofula. When these cases belong to the category of the surgical, they are usually cases where the point of inoculation is more or less removed from the gland or glands involved. Any lesion of cutaneous or mucous surface, recent or old, may lead to this. In the mouth, for instance, a mucous patch, a canker sore, a diseased tooth, an inflamed tonsil, may serve equally well. Whereas on the body surface any abrasion or pathological defect may afford a port of entry, although the germ may be transmitted to the nearest lymph gland, and the lesion through which it enters may heal without any visible reminder of the previous infection.

The lymphatic nodes in the neck, for instance, may be affected as the result of some skin disease of the face or head, of which eczema is the most common form, or through diseased eyelids, as the result of catarrhal or specific ulcers in the nose; of a diseased middle ear, or through any dental or mu-

cous lesion in the mouth or pharynx. The nodes act as filters and become blocked or plugged as do many other filters, by which obstruction a limitation of infection is for an indefinite time produced. This is brought about in effect by an inflammation, *i. e.*, a lymphadenitis by whose inflammatory products the lymph channels are obstructed. Along with this goes usually a certain degree of peri-adenitis, by which perhaps still further protection is afforded. The tubercle bacillus is non-motile, and infection of nodes which are not in the direct course of the lymph stream must probably be explained by conveyance through the agency of migrating amoeboid cells. It is of interest, also, to remember that infection is spread usually through glands belonging to a definite regional system. Thus if it be one of the deep glands which is first infected, it is those belonging to the deeper group which become later involved. Nevertheless as there are connecting branches between the two systems infection may spread from one to the other. As long as infection is confined to the nodes the patient is protected against miliary invasion. So soon, however, as the last lymphatic glandular filter has been passed, dissemination must and will readily follow.

Tuberculosis of bone.—Next to the nodes the bones are most frequently involved, and most so in children. The favorite location is in the neighborhood of the epiphysis of long bones; next, most commonly in the cancellous tissue of the short and irregular bones. We can scarcely imagine a primary tuberculosis of an unexposed bone, consequently, disease of this kind is always a sign of a previous and, perhaps, concealed lesion. When bacilli are once floated loose in the blood-stream they are more likely to be entangled by this peculiar tissue, growing bone, than by any other part of the body. We have, as it were, a mycotic embolism of a minute artery, the fixation of which gives ready impetus to the formation of a minute nodule of infectious granuloma. It is well known that the typical manifestations of tuberculosis in a bone consist of a conical infarct or sequestrum, and König taught that this was due to an occlusion of a small artery by a tubercular embolus; while Mueller, one of his pupils, proved the accuracy of this view by direct intra-vascular injection.

It is to one point, especially, in connection with bone tuberculosis that I desire to allude at this time, and that is to a form of acute miliary tubercular osteomyelitis corresponding in bone to acute miliary tuberculosis in the lung. Its clinical manifestations are not so very different from those of the acute infectious variety due to pyogenic infection, save that they are a little less acute. There are not the fulminating attacks, nor the intense pain which characterizes the latter form, and, yet, it may be followed by nearly as much local destruction. Nor is it likely to be so early recognized, nor does it perhaps call for quite as early radical treatment. Moreover, if allowed to go for a time unrecognized it is not so likely to determine the death of the individual, since spontaneous relief, after a fashion, is more commonly afforded. This form of disease is described alike by French and German writers; but I have never seen any reference to it in English. König makes it the fourth of his forms of osteo-tuberculosis, and Kiener and Charvot gave it a somewhat imperfect description a few years ago. The periosteum is more commonly involved than in other forms, and there is no tendency to regularity or limitation in the formation of sequestra. It has been my lot to meet with several cases of this kind for which more than once I have had to practice amputation. The last distinctive case which I saw was one of nearly total necrosis of the shaft of the tibia, with spontaneous perforation of the skin in the endeavor to eliminate the sequestrum, which consisted of this diaphysis. This had been regarded at first as a case of acute rheumatism.

I think we have also a sub-form of this character where the acuteness of the disease consists simply in an exacerbation of an old and latent focus in the same bone.

This condition may be fatal, sometimes by intensity of a mixed infection from the introduction of a septic element, or sometimes by metastatic and general miliary disease.

Tuberculosis of joints.—A large proportion, especially in children, of tubercular joints, are really in effect extensions of tubercular foci in adjoining bones. Nevertheless, a form of primary synovial tuberculosis is known, and is more frequent in the adult. Tubercular infection of a previously healthy

joint presupposes the entrance of the germ through the respiratory tract, alimentary canal, or some surface lesion. The growth of co-called fungus granulation tissue into a joint is precisely similar to its growth or formation in a tendon sheath, and may be thus described. It is well known that wherever tubercle bacilli lodge, they act as specific irritants, which produce granulation tissue of a well-known type. This granulation tissue, as it forms, has the power of making way for itself in any and every direction, and the firmest and thickest bone will melt away before its advancing pressure, as it does before that of an aneurism. This tissue may gradually replace the cancellous tissue of the head of a bone, and finally escape by one or more perforations of this compact shell to burrow underneath the periosteum and work its way toward the skin, or to perforate articular cartilages and proliferate within a joint cavity. Wherever it appears it is always the same in structure, although sometimes more compact, or at other times more œdematous. It often happens that the free space of a synovial cavity is filled up with this tissue, which becomes more or less condensed, and which disintegrates, and in many ways affects the surrounding, previously healthy tissues, before a drop of pus is formed. It is seldom under these circumstances that the tubercle bacilli evince any pyogenic properties by themselves; but a mixed infection is likely to occur at any time and secondary pyogenic infection does in fact occur sooner or later in every case. The result of this is that this granulomatous tissue of low vitality breaks down very easily, and we have, as the consequence, an abscess formation and all the well-known phenomena of the later stages of white swellings. Of course, if at any point this granulation tissue has perforated the skin, local infection necessarily occurs, otherwise the infection is usually through internal channels.

This same condition of affairs obtains when we have to do with tuberculosis of tendon sheaths. Hueter called this affection *tendo vaginitis granulosa*, and the granulation or fungus tissue with which these sheaths are often filled has precisely the same origin and significance as above. Furthermore, Riedel has shown us that the rice-grain bodies so often found in hygromata of tendon sheaths always indicate synovial tuber-

culosis. This condition is most common as the extension of a tubercular process along tendon sheaths, following perforation of a tubercular joint, but is now known to be also a primary lesion. When primary it is usually an embolic infection, which when once begun pursues everywhere a typical course. The tendon itself is usually covered with a thin layer of the same granulation tissue, and may be so weakened as to easily rupture.

When the disease is primary in a tendon sheath, an adjoining joint may easily become secondarily affected. When the fungous granulations forming hard white masses are separated by friction, the so-called rice-grained bodies are formed, or else they are the product of a peculiar fibrinous inflammation and exudate. The disease is most common in the wrist, next most so about the ankle.

Dmochowski has investigated the tonsils in fifteen consumptive patients, and in each case discovered more or less outspoken evidence of local tuberculosis. The naked eye appearances were scarcely altered, but the epithelial cells of the crypts die soon after infection, and, finally, produce a superficial dead layer. After this we may have the tonsils studded with miliary nodules, or these may coalesce and the whole gland become little less than a tubercular gumma.

A similar infection of the mammary gland I have elsewhere described. (See *American System of Gynecology*, Vol. 2, p. 358). The commonest manifestation of mammary tuberculosis is to be met with in the form of cold abscess and chronic fistula; aside from these we have to deal with disseminated tubercle, and tuberculous gumma; local infection having occurred the disease takes much the same course as in the lungs. Multiple true tubercles are formed, which may for some time remain separate, or they coalesce, in which case we have the confluent form. To these succeed caseation, which may be followed by atrophy and more or less calcification, or there develop cold abscesses as the result of a degenerative process, or acute abscess as the result of mixed infection. Probably a true miliary form exists, but has not yet been generally recognized, perhaps, because patients presenting it are not seen

sufficiently early, *i. e.*, have passed this stage by the time they apply for treatment.

And so it goes on all over the body, there is no part which is exempt from liability to tubercular infection, and tubercular processes are everywhere essentially the same, modified only by character of tissue and nature of environment. Every surgeon of experience sees astonishing manifestations of the penetrating and permeating power of this peculiar granulation tissue; the toughest and strongest fasciæ are perforated by it as is the copper sheathing of large vessels perforated by various salt water parasites, while at the same time masses of this tissue are deflected, as it were, or turned aside and made to take most unexpected directions by the resistance which a thin layer of fascia will interpose. An intelligent comprehension of infectious granulomatous tissue, and its properties, will enable a ready understanding of such processes as caries, necrosis and spontaneous separation of sequestra, as well as of the clinical features of white swellings and ganglia and a variety of other common manifestations of tubercule, which I regret to say are so often the bug-bear of students, and of all those who are not grounded in pathology.

Probably the most difficult of the many problems which a study of this disease offers is that concerning the source of the infectious element and its hibernation for an indefinite time in some concealed part of the system. Evidence has of late accumulated to show that in the deep collection of lymph nodes we often have both concealed and long standing foci of infection which, like powder mines, give rise to sudden explosions.

In 1887 Bollinger carefully examined the bronchial lymph-nodes of a large number of children who died during a severe epidemic of the measles. He demonstrated that tuberculosis may be latent in a child apparently in perfect health, and he found abundant bacilli in the lymphatic nodes at the roots of the lungs, and in the mediastinum, in children who were free from tubercule in the lungs proper or other parts of the body. Also it has been demonstrated by numerous observers that children may have for a long time latent glandular tuberculosis before phthisis develops, since in children the lymphatic nodes are in a high state of functional activity.

Loomis (*Med. Record.*, Dec. 20, 1890,) and Northrup (*N. Y. Med. Jour.*, Feb. 21, 1891,) have lately made important communications showing how the primary infection of tubercle, especially in children, often occurs in the bronchial lymph nodes. Loomis reports, for instance, such an autopsy as follows: A young woman æt. 26, who enjoyed perfect health to within four weeks of her death, was seized with fever and chills, which led first to a diagnosis of malarial fever that was afterwards changed to that of general pulmonary tuberculosis. At the autopsy the lungs were found studded with fresh tubercles. No old tuberculosis was found in the lungs, nor could any point of infection be found *except one large bronchial gland* which presented all the characteristic changes of an old tubercular process. He mentions also a case presented to the New York Pathological Society by Dr. Van Giesen, of an infected bronchial gland, evidently tubercular, removed from a person dying from phosphorus poisoning. No tubercles were found in any other part of the body. These gentlemen have made it so very clear, by their own cases and those which they have collected, that the internal glands may be long and latently subject to tuberculosis before they disseminate the disease, that I think we have large reason to take the ground that infection of parts which interest the surgeon may occur with equal ease from these internal sources. Considering that the life-stream is from the lungs toward the lymphatic nodes, it is not more difficult to imagine how a lung may be affected from this source than how a bone at some distance may be. They are probably conveyed into the veins first, after which they are easily distributed to distant parts of the body.

Müller, commenting upon 500 autopsies in children with respect to the frequency of tuberculosis, regards the lungs and next to them the bronchial glands as the most common paths of infection by tubercular processes. He recognizes the fact that the glandular infection may be primary, in which case the lungs are secondarily involved by contiguity, in which case also the apices are not the parts first involved. It is characteristic of tuberculosis in children that the lymph glands should be early involved; 170 times out of 209 cases was this the case, and of these 170 the bronchial glands were involved in 131.

Next to these stood the mesenteric, 78 times; the cervical, 17; the mediastinal, 16; retro-peritoneal, 10; portal, 7; epigastric, 6; inguinal and retro-maxillary, each 3. Tuberculosis of the bones and joints occurs most often in the fourth year of life.

Sprengel has called attention to the importance of a previous tubercular infection of the skin or mucous membrane by which open disease may be produced, either through the lymph stream or the arterial. It is necessary also not to overlook the existence of primary infection through inherited, *i. e.*, congenital tuberculosis. All writers on the subject agree that the tubercular process often remains latent for a long time, by latent meaning localized, and that generalization is especially favored by any disease which causes prostration, as also by certain specific diseases, like measles, scarlatina, pneumonia, diphtheria, puerperal fever, etc. This generalization is effected sometimes by the lymph system, much more often through the blood system; thus out of five hundred cases of tubercular disease, eighty-six were of the general miliary form, nineteen of these of the most acute type. Müller finally lays considerable stress upon a peculiar form of tubercular disease in children, characterized by a tendency to caseation, as an instance of which we have the relative frequency of caseous pneumonias.

Demme has recently reported some interesting observations in this same field, one of them being that of an infant of six months, that displayed a tubercular ulceration over the left breast. He considered it most probable in this instance that he had to deal with a tubercular infection involving a small abscess which had resulted from a limited mastitis directly after birth, since the mother and sisters of the child, who were themselves suffering from consumption, often applied to the ulcerated surface one of their soiled handkerchiefs. Another case was that of multiple tubercular disease of the mouth in an 8-year-old, predisposed, girl, who suffered at the time from pulmonary lesions, and who died of acute generalized miliary disease. The affection presented a remarkable similarity to mucous patches, and had been mistaken for inherited syphilis. Antiseptic treatment produced no effect, however, and tubercle bacilli were found in the local lesions.

A third case was that of a tubercular meningitis following quickly after injury to the skull, in a child previously healthy. At the autopsy the pia was found studded with miliary tubercles, and an old tubercular bronchial gland was recognized. In such case as this it is probable that almost any injury may prove sufficient to determine an outbreak of tuberculosis.

Tricomi has reported a case of joint tuberculosis which manifested itself in the early years of childhood, and apparently healed with ankylosis of the joint. Seventeen years later after forcible efforts had been made to straighten the limb the patient died of general tuberculosis. Examination of the joint revealed old tuberculous foci which had communicated with the joint, with the typical features of fungous arthritis. The internal organs were studied with miliary tubercles, all fresh, showing nowhere any old lesion save in the joint. He interprets the case with propriety as in all probability demonstrating the possible long period of latency and the fresh eruption after operative provocation. (*Giornale internaz. delle scienze mediche.*, 1886, 8, p. 62S.)

[TO BE CONTINUED].